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## THE CATHEDRAL OF LYON.

[View of the Cathedral of Lyon, from the Rhône.]

THE city of Lyon (commonly, but incorrectly, written Lyons) ranks next to Paris as the most important place in France. It is situated between the Rhône and the Saone, a little above their junction, in the department of the Rhône. But we propose here to treat only of the cathedral, which is dedicated to St. John, and is one of the most interesting and remarkable of the public buildings of the city. It owes its origin to a baptistery, founded here by St. Arège about the commencement of the seventh century, and dedicated to St. John the Baptist, which edifice was erected merely as an accessory to the church of St. Stephen, built here by St. Patient in the fifth century; but in the lapse of time it became itself the principal place of worship, and by the tenth century it ranked as a cathedral, forming the primatial church of the Gauls. It had been previously ruined, and repaired several times prior to the ninth century, at the commencement of which (during the reign of Charlemagne), Archbishop Leyderade once more re-established it, and deposited within its walls the relics of St. Cyprian, bishop of Carthage, and of other saints and martyrs. Between two and three centuries later, the present edifice was begun; and although at different periods the popes, the kings of France, the archbishops of Lyon, and the chapter, contributed towards the expenses, the cathedral was not finished as we now see it till the reign of Louis XI., in the fifteenth century. In this last rebuilding, blocks of marble and other remains from the ruins of the forum constructed at Lyon by the Roman emperor Trajan were used.

The western front is the most modern part of the cathedral. This has been praised by many for its magnificence, whilst by others it has been judged heavy in its general effect. There are three central doorways, varying in size, but similarly decorated with rich architectural ornaments, and above them is a very splendid rose or circular window. There are four towers, low, square, and somewhat heavy in their appearance, but richly sculptured. Three of them are deserted and entirely empty, but the

fourth contains one of the heaviest bells in the kingdom, weighing no less than 35,000 lbs. Two galleries, with open balustrades, extend all the breadth of the façade. The interior is simple in its general character; but the length of the nave, the elevation of the vaulted roof, the multiplicity of the columns, the richness of the sculpture, and the beauty of the windows, which admit only a sombre and mysterious light, give to the whole an air of majesty and grandeur which is frequently wanting in buildings more profusely decorated and of higher pretension. The nave appears to be of the thirteenth century, when Gothic architecture had arrived at its highest state of perfection in France, and when most of the beautiful works of art still existing in that country were produced. Its entire length is about two hundred and sixty feet, its breadth between the pillars thirty-six feet and a half. The gallery between the nave and the choir is a work of the last century only: it is ornamented with Corinthian columns, and with a frieze above, enriched with bas-reliefs of a very excellent kind. The transept and chancel belong to the more ancient parts of the cathedral: near the spot where the former branches off on each side of the body of the building, we find the great altar, which is only remarkable for the two crosses it bears, one at each extremity, and which were placed there in the thirteenth century, to preserve the memory of the union of the Latin and Greek churches, a measure decided on at a great General Council held in the cathedral in 1724. Along the aisles extend a suite of chapels, founded at different times by the archbishops and canons: among these the most worthy of notice is that which stands nearest to the entrance on the right, the foundation chiefly of Cardinal Charles de Bourbon, who was the archbishop of Lyon towards the middle of the fifteenth century. This is an exquisite specimen of the later Gothic, being particularly distinguished for the richness, variety, and delicacy of its ornaments: the foliage is peculiarly beautiful. Within the chapel we find the arms of the founder, and of his brother the duke Pierre of Bourbon, who, after the death of the cardinal, finding the work unfinished, undertook the care of its completion. An inscription on the side of the altar in this chapel apprises us that the heart of Cardinal Alphonse de Richelieu, archbishop of Lyon, was deposited there. But the famous clock, which is placed in the left arm of the transept, is, before everything else, the chief object of attraction to the numerous strangers who visit the church of St. John. This is certainly a very remarkable and interesting piece of mechanism, considering the period of its construction, 1598. It is built in the form of a square tower, surmounted by a dome, and loaded with a profusion of ornaments in the worst possible taste, the additions of a later age. It was a perpetual calendar, civil and ecclesiastical—a complete system of astronomy in action. It marked the century, the year, the day, the hour, the minute, the place of the sun among the signs of the zodiac, the phases of the moon, &c., &c. The mechanical effects which accompany the more useful movements of the machine are very singular: a cock, elevated on the summit of the dome, announces the hour by the clapping of his wings and by crowing; then a chime of little bells is heard to play the air of the hymn of St. John; and during this, several figures, animated by concealed springs, represent the mystery of the Annunciation, the whole being concluded by the clock striking the hour. The clock has been for some years out of repair. The original constructor was Nicolas Lippius of Bâle.

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## HISTORY OF A COAT.—No. III.

[Continued from No. 544.]

In our last paper on this subject we traced the processes through which short-stapled wool passes from the time it leaves the back of the sheep till it assumes the form of long cylindrical rolls about the thickness of the finger. These rolls, slivers, or cardings are taken up, one by one, from the apron of the carding-machine, by a boy or girl, and removed to another machine close by, called the slubbing-machine, or the slubbing-billy, where they are joined end to end in a continuous cord, called a slubbing. As the slubbing-billy was at one time the cause of much undeserved reproach against the factory system, we will illustrate its mode of action by a cut. (See p. 388.)

AA is a wooden frame, by which the other parts of the machine are supported. A moveable carriage DD runs from end to end of the frame, on small wheels, 1, 2. F is a hollow cylinder of tin-plate, about six inches in diameter; and it receives a rapid rotatory motion from a band and pulley in connection with the wheel E; the spinner stands at Q, and turns the wheel with his right hand, by means of a winch attached to the axle. When the cylinder F is rotating by these means, it communicates a still more rapid rotation to a number of steel spindles, 3, 3, set upright in a frame, by means of separate cords passed round the pulley or whorl of each spindle. B is an endless apron, on which a boy or girl places the cardings or long rolls of wool, side by side. The spinner, or 'slubber,' stands behind the moveable carriage, pushes it onward to the other end of the machine with his right hand, and then fastens the end of each carding to a spindle, there being as many cardings as spindles. The ends of the cardings pass under a roller C, and through the opening of a wooden clasp G. The spinner draws the carriage back about eight inches, carrying with it eight inches in length of every carding. By the action of a wheel, 5, connected with the carriage, on a lever and pin, 6, 7, connected with the frame, the clasp G is made to grasp firmly the several cardings, so that no more than the eight inches can be drawn out. The spinner then recedes to the end of the machine, drawing the spindle-carriage with him, and stretching out the eight inches of every carding nearly to the full length of the machine. As he recedes, he turns the wheel E with his right hand, and the rapid rotation which he thus gives to the spindles imparts a twist to the elongated cardings, thus giving them the first approach to the thread form. When this elongation and twisting are completed, the carding (now called slubbing) is made to wind conically on the spindles, by means of a moveable wire, 8, connected with a bar, 4. When this is done, the slubber moves the carriage to the other end of the machine, draws out eight inches more in length of each carding, and, by drawing the carriage back again, elongates those portions to the extent of several feet, and so on continuously. The reader will appreciate the action of this machine by remembering, first, that little rolls of wool, about half an inch in diameter, are placed at the left hand of the machine; secondly, that eight inches in length of each roll are drawn out to the extent of several feet, and slightly twisted; thirdly, that this continuous thread, or slubbing, is wound on spindles, which, when filled, are replaced by empty ones.

We have now to state that, although the cardings are only twenty-eight inches in length, the slubbing produced from them is continuous. This is effected by the boy or girl who attends the machine, and who, while laying the cardings on the endless apron, slightly unites the ends of one set to those of the set which follows; and as there are from fifty to a hundred spindles in each machine, the attendant must keep up a supply of cardings for all of them, just as fast as the slubber can spin them. Generally speaking, four attendants, called 'pieceners,' are required to supply the cardings as fast as the slubber can work them. Unjust and cruel treatment towards these children was the cause, some years ago, of a great outcry against the factory system. The slubber was engaged at 'piece' work, and could work or not, as he pleased; if he chose to be idle for half an hour or an hour, a great accumulation of cardings from the carding-engine resulted, which the children were obliged to lay in heaps on the floor. When the man returned to his work, he

endeavoured to make up for lost time by redoubled exertions, the consequence of which was that the children could not lay the cardings on the endless apron so fast as he could use them; hence followed blows and cruel treatment, in which the 'billy-roller' (marked C in the cut) was often used as an instrument of punishment. It was proved before the Factory Commissioners that the master manufacturers totally discountenanced, as far as they could, this harsh and unjust mode of treatment; and so far from being a proof of the cruelty of the factory system, it proves just the reverse, since, if the movement of these machines depended on the steam-power which moves the carding-machine, instead of on the caprice of the workman, the irregular and unequal labours of the children would become regular and systematic, and each one would know precisely how much he or she had to do in a given time. This circumstance has been so strongly felt, that attempts have been, and, we believe, are being made, to connect the slubbing-machine with the carding-engine in such a manner that steam-power shall effect both operations.

When the wool has been brought to the state of slubbing, it is a loose kind of worsted thread, but with scarcely coherent strength enough to hold together. To reduce it still more in thickness, to twist it, and to make it tolerably hard and strong, are the objects of the next process—spinning. This process has already been described, in connection with the cotton manufacture;* and as it differs but very little, whatever be the material employed, a few words will suffice respecting the spinning of wool. There are two kinds of machines employed in spinning, viz. the jenny and the mule; but in each one the slubbing is held fast at one end, while the other, being attached to a moveable carriage or frame, is stretched or drawn out; while, from the rapid rotation of the spindles to which the wool is attached, the yarn becomes very much twisted, and thus considerable strength is imparted to it. Spinning is, in fact, a repetition of the process of slubbing; in the last-mentioned process, the cardings are elongated, and have just such a degree of twist given to them as will enable them to bear the strain without breaking; those slubbings which are destined to form the warp of the cloth being more twisted than those intended for the weft. In spinning, the slubbings are drawn out to about three times their former length, and a degree of twist is given to them proportionate to the purpose to which they are to be applied.

The materials for our coat are now in the form of yarn, or woollen thread (not worsted, as this is made of long wool, and has nothing to do with our present subject). The fibres of this woollen yarn are not so straight and regular as those of cotton yarn, since the former are purposely left somewhat entangled, in order to facilitate the process of felting or fulling. The yarn has now to be woven into cloth, and here again we may observe that the different material employed does not render the process very different from that of cotton-weaving. We will therefore refer to vol. ix., p. 45, for a few details respecting cotton-weaving, and here merely notice the points in which wool requires a modification of the process. Broad-cloths are sometimes woven to the width of twelve quarters, and must therefore require a very large number of warp-threads laid parallel to one another. This arranging of the threads is called warping, and is effected by means of a machine called the warping-mill. Continuous threads, about sixty yards in length, are wound regularly, and side by side, round a large reel. After a little subsequent cleansing and dressing, the yarn is wound on the warp-beam attached to the loom, and the process of weaving commences. Three thousand threads, laid side by side, for the warp, will make a piece of cloth about one hundred inches wide; and each thread, which is sixty-five yards in length at the commencement, contracts to about sixty-two during the process of weaving. The yarn which is to form the weft, or cross-threads, is of a somewhat different quality from that forming the warp; it is wound from the spindles of the spinning-machine on to the pirn or bobbin of the shuttle, one pound of weft being required for about a yard of cloth one hundred inches in width. In weaving woollen cloths, a few threads of coarse and strong yarn are laid at the edges; these form what is called list, and are intended to afford a firm hold for some hooks by which the cloth is stretched during a subsequent process; this list is considered as waste material when the cloth comes to be cut up for use. We must here remark that the use of such enormous widths as twelve quarters (three yards) is owing to the shrinkage occasioned by the subsequent fulling process: cloth which is twelve quarters in width when it leaves the loom, is but little more than six quarters when ready for sale.

In the manufacture of cotton, silk, or linen, when the weaving is finished, the range of processes has approached nearly to an end; but in the woollen manufacture the case is far otherwise; that peculiar texture which we call the nap or pile requires many nice processes for its production. The appearance of the cloth when it leaves the loom may be easily conceived; all the threads are visible, but they have a more hairy or fibrous appearance than those of cotton, silk, or linen; and these fibres, still further loosened and worked up, subsequently form the nap or pile, after the various processes of scouring, fulling, tentering, burling, milling, teazling, shearing, &c.

As a considerable quantity of oil is used with the wool in the early part of the manufacture, this oil must be removed after the weaving by the processes of scouring and fulling. The cloth is steeped for three or four hours in an alkaline mixture, and then removed to the fulling-mill, where it is beaten for two hours. The cloth is put into a kind of trough, and two fulling-stocks (which are large wooden hammers) continually beat against the cloth, turning it over and over in various directions. The handles of the hammers are several feet in length, and are fixed in an inclined position, so that, by the action of steam or of a water-wheel, the mallets or stocks fall with great force against the cloth. A constant supply of water is flowing through the mill, carrying with it the grease and other impurities. Sometimes soap is employed to assist the removal of the grease; but, whatever be the detergent employed, the cloth is afterwards fulled a second time in clear water. This series of tossing, rubbing, and beating for three hours, has the effect of removing all the grease, and of partially felting the cloth, that is, its appearance is midway between that of a woven tissue and of a felted cloth.

The next process is that of tentering, or stretching the pieces of cloth in the open air. The tenter-frames consist of a number of vertical posts fixed in the ground, with a continuous horizontal rail fixed on their tops. Other horizontal rails are fitted between the upright posts, in such a manner as to slide freely up and down, and can be fixed at any distance beneath the upper rail by means of holes and pins. Tenter-hooks are driven into the upper and lower horizontal rails, and on these the list of the cloth is fastened; by lowering the bottom rail, the cloth is stretched to its full extent, and is then secured by pins. Here the cloth is left, exposed to a free circulation of air, until dry.

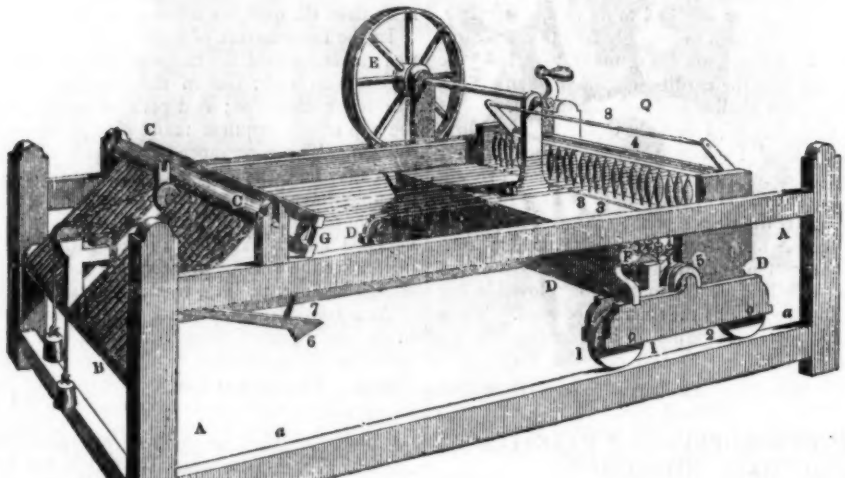
The process of burling succeeds that of tentering, and consists in a minute inspection of every part, in order that all knots and uneven threads, or extraneous matters, may be removed; any rents or defects which may be found, are repaired by introducing fresh threads. No such process as this occurs in the cotton manufacture, for two reasons: first, there is no beating process, such as the fulling of woollen cloth, which is very likely to produce holes and defects; and, secondly, there would be no means of hiding the mended places. In the cloth manufacture, the milling operation, which follows the burling, entangles

* 'Penny Magazine,' vol. v., p. 268.

the fibres of the repaired spots in such a manner as to conceal the defects and give the whole a uniform appearance. In the operation of burling, the cloth is spread out flat, and the burlers, generally young women, inspect it and make the necessary repairs. A machine, called épincéteuse, has been partially employed for this purpose in France.

The various operatives who have been employed on the wool up to the present stage are the following:—wool-sorters, who separate the wool into different degrees of fineness, to be applied to different purposes; pickers, who remove the rough impurities by hand; winnowers, who tend the winnowing-machine, where the locks of wool are separated and loosened, and the dust removed from them; scribblers, who arrange the wool in a light, thin, fleecy sheet; carders, who separate this sheet into rolls about half an inch thick and two feet and a half in length; piecemers, who join these rolls or cards end to end; slubbers, who elongate the cards into thin continuous slubbings; spinners, who still further elongate the wool and convert it into yarn; warpers, who arrange the yarn in parallel layers, to form the warp; sizers, who coat the warp-thread with a layer of size or paste; weavers, who weave the warp and weft into cloth; scourers, who remove the oil, &c. from the woven cloth; tenterers, who hang the cloth on the tenter-frame; and burlers, who examine the dried cloth and repair defects.

[To be continued.]




[The Slubbing-Billy.]

## THE BILL OF RIGHTS.

When King James II. found all his attempts to establish arbitrary power were met by a spirit of resistance on the part of the people which it was impossible to subdue, he withdrew privately from the kingdom, and the remainder of his life, which terminated in 1701, was spent as a pensioner of the king of France. The nation being left without a head, William of Nassau, Prince of Orange, who had been invited by some of the most eminent men in the country to assist the people in maintaining their liberties, took the necessary steps to provide for the regular transaction of public business, and his next care was to consult the nation as to the manner in which the government should be re-composed. As no parliament could be called except by James, who, though in exile, was still king, the prince issued circular letters requiring the several counties and boroughs throughout England to send their representatives to a convention of the estates of the realm. It met on the 22nd of January, 1689, and, after some debate, declared the throne vacant, on the ground of James having violated the fundamental laws of the kingdom. Various views were entertained as to the manner in which James should be excluded from the throne, a large party being averse to making a total change in the succession. But the more manly opinion prevailed that James having by his misconduct left the throne vacant, the free right of choosing a sovereign on this occasion reverted to the nation; and on the 13th of February the two houses offered the crown, in the name of the people of England, to the Prince and Princess of Orange (the latter a daughter of the abdicated king), the survivor of them, and their descendants, giving at the same time the entire powers of royalty to the Prince alone. This completed what is justly called the Glorious Revolution of 1688, which established the rights of the people on a firm and broad basis. It was wisely determined not again to give away the crown, as had been done at the Restoration, without taking security for the observance of the laws, which the Stuart family was expelled for violating. With this view, the Convention drew up a Declaration of Rights, in which the principal abuses introduced or sanctioned by the two last kings were shortly recited, and one by one declared to be illegal.

This Declaration was presented to the prince on the 18th of February, immediately before the crown was offered to him; and it was afterwards passed as an act of parliament by king, lords, and commons, and in that shape it is called the Bill of Rights, and is venerated as one of the main bulwarks and charters of our liberties. The principal things asserted in this Act were:—That the king has no power of suspending or dispensing with the execution of existing laws, of imposing taxes, or in any way levying money without the consent of parliament; that it is the right of all subjects to petition the king, without being exposed to punishment for any fancied abuse of that right; that the maintaining a standing army in the time of peace, without consent of parliament, is illegal; that the election of members of parliament ought to be free, and that words spoken in parliament

ought not to be censured or brought into question anywhere out of parliament; and that parliaments should be held frequently. And it concludes—That the Convention do claim, demand, and insist, on behalf of the people, on all these things as their undoubted rights and liberties.

[Landing of William III. at Torbay.—From a picture by Stothard.]

## THE DESERTS BORDERING ON PALESTINE,* AND THEIR INHABITANTS.

(From the 'Pictorial History of Palestine.')

To form an idea of these deserts, the reader must imagine a glowing and unclouded sky, over plains so vast that the view is lost in them; and entirely destitute of buildings, trees, rivulets, or hills. Often in these plains the eye meets nothing but an extensive and uniform horizon like the sea; while a few isolated palm-trees, here and there, complete the illusion by appearing in the distance like the masts of ships. In other parts the undulated surface suggests the idea of a stormy sea, while in others it is roughened by rocks and stones. Almost always arid, the land offers only some wild plants, thinly scattered, and thickets, whose solitude is rarely disturbed but by gazelles, hyænas, hares, jerboas, and locusts. Such is the character of nearly the whole country, which extends 600 leagues in length and 300 in breadth, stretching from Aleppo to the Arabian Sea, and from Egypt to the Persian Gulf.

In such an extent of country there is, however, considerable variation of soil. Upon the frontiers of Syria, for example, which is that portion of this immense desert with which we have most concern, the soil is in general rich, cultivable, and fertile. It is of the same character on the banks of the Euphrates; but in the internal parts of the country, and towards the south, it becomes white and chalky, as in the parallel of Damascus, then stony as we advance into the deserts of El Tyh and of the Hedjaz, and ultimately pure sand, as to the east of Yemen. These variations produce corresponding differences in the condition of the inhabiting tribes. In the districts where the herbage is scarce or meagre, as in the Nedjed and in the interior of the great desert, the tribes are feeble and very distant. They become less rare and nearer to one another in those parts where the soil is less bare and the oases more frequent, as between Damascus and the Euphrates, and in the cultivable cantons of the Aleppo pashalic, in the Haouran; and in the country of Gaza the Arab camps are numerous and contiguous. In the first case, the Bedouins are a purely pastoral people, living on the produce of their flocks and on a few dates; in the second, they are demi-cultivators, and sow some land, which enables them to add to their fare a little rice and barley.

This invincible sterility of the desert, even where the soil is naturally fertile, or where not absolutely sandy, is entirely owing to the absence of water; and this want of water is occasioned by the nature of the country, which, being flat and destitute of mountains which might arrest the clouds, they glide over its heated surface during nine months of the twelve without affording a single drop of rain. Thus, during the day, the sky sparkles in brilliance, and is of the finest azure during the night. In winter only, when the cold of the atmosphere condenses the clouds, they soon resolve themselves in showers; but in the interior of the desert the water thus supplied is very quickly absorbed by the arid sands. Upon the borders only it affords an irrigation by which the natural fecundity of the soil is awakened. The summer comes; and all this water disappears without any durable result in springs or perennial brooks. Hence to avoid the inconvenience of wanting water the whole summer, it has been necessary to form, by manual labour, wells, cisterns, and reservoirs, in which to preserve a supply of rain-water for the year. Such works, though rude and inadequate, are expensive and laborious, and are therefore of rare occurrence, except in the more settled districts. Besides, war may destroy in one day the labour of many months, and the resources of the year. A drought, which is but too common, may cause the failure of a crop, and reduce the inhabitants to a total want of water. It is true that, by digging, water may almost everywhere be found at from six to twenty feet deep, but this is gene-

* Although there are not, properly speaking, any deserts in Palestine itself, the deserts by which it is bounded on the east and on the south figure so largely in the history of the country, and exercised so manifest an influence on the condition and relations of its inhabitants, as well as on their ideas and sentiments, that it is desirable to be acquainted with their nature and peculiarities, to comprehend the effects produced.

rally brackish, and the supply is soon exhausted. Then thirst and famine supervene; and unless the government interferes, the villages are deserted. From this it results that the condition of agriculture is, in such border districts, most precarious, and the establishments are constantly menaced with ruin; and when to this operation of natural causes is added the weight with which the exactions of the government press upon the cultivator, it must often seem the better choice to lead a wandering life than to reside in a fixed habitation and rely on agriculture for subsistence.

In those districts where the soil is stony and sandy, as in the deserts between Palestine and Sinai, in which the hosts of Israel spent forty years, and in those of the Hedjaz and the Nedjed, these winter rains make the seeds of the wild plants shoot, and revive the thickets, the ranunculuses, the wormwood, the kali, and the numerous other plants and herbs with which the desert then abounds. They render the lower grounds marshy, which then produce reeds and grass, and the plain assumes a tolerable degree of verdure.

Major Skinner, who crossed at this season the desert between Damascus and Babylonia, describes it as having then nothing appalling but the name,—as being, in fact, a perfect garden, in which it is easy for the traveller to mark his progress by the plants he meets, as every day exhibits the predominance of some new race.

But all this glory of the desert, which supplies so many metaphors to the prophetic writers, is most transitory. On the return of the heats, everything is parched up, and the earth, converted into a gray and fine dust, presents nothing but dry stems, as hard as wood, on which no animals can feed.

Yet even the desert is not without such immunities and congenial charms as endear it to its wild inhabitants, as much as the most fertile and pleasant country can be endeared to a civilised people. Its climate is more fixed and salubrious than that of the countries by which it is bordered. The plague is scarcely known; ophthalmia is very rare; and the small-pox may be described as the only endemic malady. The Arab tribes have, from remote times, divided these wide and arid sands among themselves. These territorial divisions are necessarily of very great extent, as it often happens that the desert in an extent of thirty miles offers only a few roods of land where the flocks can find even a dry and scanty herbage. Thus, in order to obtain nourishment for a few cattle, the Arabs are obliged to overrun vast tracts, and this has engaged them to the nomade life. But besides this physical reason, which explains and justifies the Bedouin condition of existence, there are others of a political sort which are not less operative. For if, in fact, their migratory habits only proceeded from the nakedness of their country, they could advance into the fertile districts along their frontiers, and form there nearly permanent encampments, as the Hebrew patriarchs did in Palestine, ending by founding villages, like the Turkmanns and Koords. But they do not this. They choose rather to dwell in plains the most naked, in steppes the most inaccessible. And why? It is because that which the Arab values before all other things is his independence, his complete isolation from every form of superiority or patronage, whether mild or onerous, cruel or clement. That which the Bedouins most seek is to keep themselves from a position which might lead or compel them to bear arms for the pashas, and leave them at liberty to pursue what they consider their proper trade of rapine and theft. This is the great motive to them of preserving a mode of life which renders such continual and fatiguing removals necessary. But if they chance to light upon a place where they think they can enjoy security and freedom, joined to adequate resources, they remain there, and insensibly pass into the condition of settled cultivators. But if it happens, on the contrary, that the vexatious tyranny of a governor puts an end to the patience of an established village, it is no unusual thing for the inhabitants to flee in a body to the mountains, or into the plains, often changing their stations that they may not be surprised. Sometimes it happens that such people, after having become robbers from the necessities of their position, form new hordes, and ultimately class themselves into tribes. But these new people, born in a cultivable country, almost never quit the frontiers, and never without great difficulty arrive at the determination to throw themselves into the heart of the desert. The desert is the exclusive domain of the Arab who is born in it.

We have not been able to withhold these facts, as they appear to us to contribute much illustration to many circumstances which the sacred history records, and to the conditions and mutations of life which it exhibits. We thus see by what process the migratory inhabitants of the desert become, like the Hebrews, a settled agricultural people; and again, how the people settled on the borders may melt away into the great Bedouin mass. The tendency of such people to remain as near as possible to their original seats would be a most interesting circumstance if it should authorise us to conclude, or even to conjecture, that the descendants of Lot and Esau may still be found among the Bedouins, who are now almost the sole inhabitants of the lands of Moab, Ammon, and Edom.

## THE LYRE, THE LUTE, AND THE GUITAR.

### No. I.

Stringed musical instruments, partaking more or less of the nature of the harp and the guitar, have been in use from the very earliest times. In the Old Testament there are repeated allusions to them; and the monuments of antiquity brought to light by modern research show numerous specimens of such instruments. They may be divided into two classes, viz. those of which the strings are struck by the finger, as in the harp; and those which are not only so played, but are provided with a neck or finger-board, on which the fingers of the left hand press the strings so as to produce different tones. In the present paper we will speak of instruments of the former class; and, in a second, of those of the latter.

The Egyptians, Greeks, and other early nations, had numerous theories concerning the invention of the lyre, which was probably the earliest instrument of the harp kind; but these theories, as generally happens in such cases, very much contradict one another, and we may therefore dispense with a notice of them here. Particular mention is made, in the Bible, of Jubal, a maker of stringed instruments: different opinions have been expressed as to the form of these instruments; but it is believed that the Hebrew lyre, which was for a long period used at feasts and rejoicings, consisted of ten strings, which were sounded not by the finger, but by a plectrum or quill.

The form of the lyre is represented to have been very varied: provided there were means of fastening the two ends of every string, the wood-work or support might be made to assume any convenient form. Various names were given to the lyre, such as *cithara*, *lyra*, *chelys*, *testudo*, &c., and many attempts have been made to determine what were the distinguishing characteristics of each sort; but the line of demarcation between them certainly cannot be now discovered, for it was optional to put as many strings to the lyre as the maker pleased. The testudo, from its name and its shape, has been supposed to have given rise to instruments of the lyre kind: the idea of Apollodorus was this:—"The Nile, after having overflowed the whole country of Egypt, when it returned within its natural bounds left on the shore a great number of dead animals of various kinds, and, among the rest, a tortoise, the flesh of which being dried and wasted by the sun, nothing was left within the shell but nerves and

cartilages, and these, being braced by desiccation, were rendered sonorous:" this shell, being kicked against by a passer-by, emitted musical sounds from the stretched cartilages, and gave the first idea of constructing a lyre. This is the theory; but it is obvious that a fertile imagination might soon conjure up other theories fully equal to this.

It has been observed that the lyre serves in some respects as a history of the manners of nations: David danced, and played on the psaltery, or Hebrew lyre, before the Ark: Themistocles blushed, at a banquet, at being forced to betray his inability to play on the lyre, a proof of unusual ignorance in a high personage: Nero was an excellent lyrist, and used to play in public. As to what period the lyre came into disuse in different countries, it would be hazardous to offer an opinion derived from any ancient pictures, for artists frequently take great liberties in these respects: an instance of this is given by Dr. Burney:—"In the reign of George II., a marble statue was erected to Handel in Vauxhall Gardens. The musician is represented playing on a lyre. Now if this statue should be preserved from the ravages of time and accident twelve or fourteen hundred years, the antiquaries will naturally conclude that the instrument upon which Handel acquired his reputation was the lyre, though we are at present certain that he never played on a lyre, nor even saw one, except in wood or stone."

In all the instruments to which the above details relate, it is a matter of doubt what was the relation between the strings as to harmony; whether they were attuned to certain chords, and whether those chords resembled those at present acknowledged by musicians. In most representations of the lyre, the strings are nearly of equal length; and therefore unless they were of unequal thickness, or unequally stretched, they would all yield similar tones. This appears to be the most marked point of distinction between the lyre and the harp. In all varieties of the latter instrument, the strings gradually increase in length from one edge of the instrument to the other, in order that, by using strings of different thicknesses, the thicker for the longest strings, a great range of tones may be produced without stretching any of the strings to an extent which they are not able to bear.

When Bruce was in Thebes, he saw, in a cavern or grotto, a picture in fresco of a man playing on a harp: comparing the harp to the height of the player, he guessed the former to have been about six feet high. It is well known that soon after the publication of Bruce's narrative of his travels, it became a sort of fashion to heap ridicule and discredit on all the remarkable passages in the book: the harp did not escape these attacks; for it gave rise to a remark by Lord North, which was intended to have more than one meaning, viz. "that it was not a harp, it was a lyre." We believe, however, that this, as well as other parts of Bruce's narrative, has received subsequent confirmation.

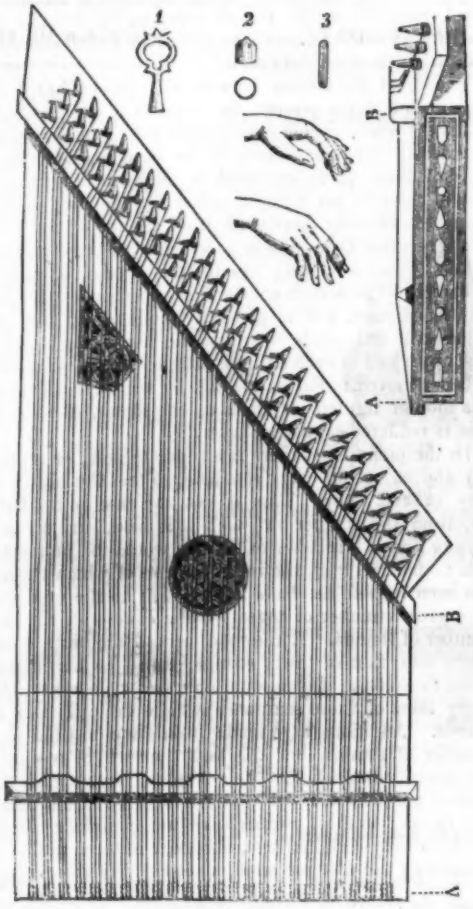
The steps by which the harp has descended to later days, and the successive deviations from the lyre-form to that of the harp, we need not dwell on here. How or when they were brought to Britain we do not know; but in Wales and Ireland the harp is connected with legends extending back to a remote period. In the time of the Welsh princes, an hereditary harp was preserved with care in the household of every prince or lord, to be handed down successively from one baron to another. It seems probable that there were single, double, and triple harps, of the latter of which Mr. Jones says:—"It has three rows of strings: the outside rows are unisons; the middle row the flats and sharps. Its compass extends to five octaves." This means that there were two parallel rows of strings, one for the right hand and one for the left, the corresponding strings being tuned exactly alike; and between these two rows was a third, the strings of which are tuned to the semitones of the outer rows. The Irish had harps of different kinds, probably to perform music of different styles: one was something like the Welsh harp; a second was a species of dulcimer; and a third was a kind of guitar, with ten strings. The Anglo-Saxons appear also to have been acquainted with the harp; for our chroniclers relate the story of Alfred the Great reconnoitring the Danish camp in the disguise of a harper. A similar device was played by Anlaff and other Danish chiefs upon Athelstan.

The great distinction between all ancient harps and those in use at the present day consists in the pedals, by which the power of modulation of the instrument is greatly increased. The frame-work of the harp consists principally of three parts, arranged in the form of a triangle. One of these is an upright pillar or support; another branches obliquely downward from the top of the pillar in a serpentine form, and is provided with pegs, to which the strings are attached; the third is a long hollow kind of barrel. The sounding-board is a portion of this last-mentioned piece, and is generally made of fir, and provided with little studs, to which the strings are attached. The upper end of each string is attached to a peg, capable of being moved round in a socket by means of a key, and this motion tightens or slackens the string, whereby the tone is rendered higher or lower.

In the piano-forte there is a separate note, or separate key and string, for every semitone, so that the player can play in every key. This is not the case in the harp; for, from the manner in which it is held, and for other reasons, such a number of strings would be unmanageable; and nearly all the improvements of which the harp has been the subject have had relation to the production of a great number of tones from a comparatively small number of strings. A common form of the harp in early times was that of thirty strings, tuned to the diatonic scale, so that the player could only play in one key, there being none of those semitones which we call flats and sharps. Additions were made from time to time to the number of strings, but this left the evil of a want of semitones unremedied. Luc-Antoine Eustache, a Neapolitan gentleman, is said to have been the first to remove this defect; but his means were too complex: he provided seventy-eight strings, disposed in three ranks, one containing the diatonic scale, a second containing octaves to the former, and a third containing semitones. The difficulties of playing this instrument were found to be more than a match for the increased power obtained, and it was abandoned. An attempt was next made to combine two rows of strings in such a manner as to produce the desired result; but it does not appear that this attempt was successful. About the end of the seventeenth century, a contrivance was attached to the harp by which the tone of any particular string could be raised half a note; but this contrivance had to be worked by the hand of the player, so that whenever he had an accidental flat or sharp in the course of a piece of music, he had only one hand at liberty to play the instrument.

It was (according to M. Béchem) Hochbrucker who, in the early part of the last century, invented the mechanism of *pedals*, by which the pitch of certain strings could be raised a semitone. The mechanism was carried up from the pedals to the pegs at the top of the harp; and the upright column, which had hitherto been made solid, was now made hollow in order to admit the connecting mechanism. This mechanism was afterwards improved by other persons, and the harp ultimately became an instrument having seven pedals. The operation of these pedals was this:—each one was devoted to a particular note in the gamut or octave: by pressing down a pedal, some levers and other connecting mechanism raised by half a tone the pitch of the note connected with that pedal, throughout all the octaves; and as any one or all of the pedals could be pressed down at once, the strings, which were at most forty-three in number, were

capable of producing all the semitones in six octaves, a result which cannot be effected on the piano-forte with less than sixty-seven keys. These strings were attuned to the diatonic scale, or scale of whole tones, and the semitones were produced by the pedals.




[The Ckánoón.]

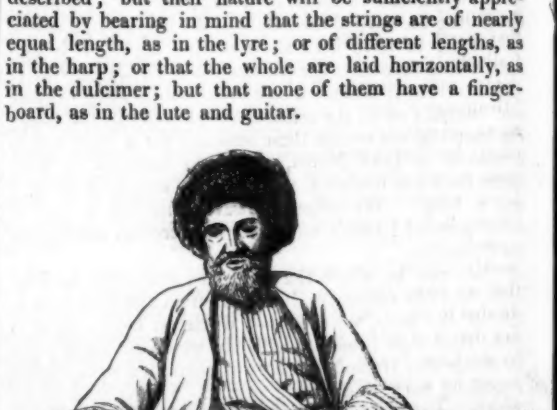
No. 1 is the key; 2, the ring or thimble; 3, the plectrum. A and B, in the small figure, show the mode of fixing the strings in A and B of the larger one.

But the greatest improver of the harp was Erard, an elder member of a distinguished London firm. Such a harp as we have just spoken of is called a *single-action* harp, because each pedal is capable of producing one single change. An extension of this is the *double-action*, produced by very beautiful mechanism: this is of such an effect, that one pedal can give to a string three different tones, sharp, flat, and natural, separated from each other by semitones. For instance, if a string, in the natural position of the pedal attached to it, produced C ♭, a moderate pressure on the pedal will raise it to C ♮, and a further change of position raises it to C ♯. By means of seven pedals, all possessing this double power, and devoted respectively to the seven notes of the octave, every string is subject to the foot of the performer to the extent of three different tones; so that in whatever key a piece of music may be written, the harp may be made capable of grappling with it. This, however, does not get rid of a defect which is not seen in the piano-forte: a chromatic passage, that is, a rapid succession of semitones, cannot with ease be played on the harp, because there are not, as in the piano-forte, strings to every semitone: the difficulties of playing are very great to the harpist. We do not propose to enter into the minutiæ of construction, and shall therefore refrain from dwelling on various modern improvements on the harp, having relation more or less to the action of the pedals.

There have been two forms of musical instruments which, so far as we have now the means of judging, seem to have resembled each other, viz. the *psaltery* and the *dulcimer*. We notice them here, because they may be deemed a kind of harp held horizontally. The dulcimer was described by Dr. Burney as an instrument of a triangular form, strung with about fifty wire strings resting on a bridge at each end, the shortest wire being about eighteen inches in length, and the longest about thirty-six. The instrument is laid out flat before the performer, and he plays on it by striking the strings with two small rods, sticks, or hammers, one held in each hand, the force of the stroke being varied according as the tones are required to be *piano* or *forte*. The *psaltery* appears to have been of a smaller size, of a four-sided figure, and to have been provided with much fewer strings than the dulcimer.

A kind of dulcimer forms a favourite instrument in Egypt at the present day. It is of a four-sided figure, with three rectangular and one sloping side. A specimen of this instrument which Mr. Lane examined, and which is called a *ckánoón*, was about forty inches long, sixteen inches wide, and two inches deep. The face and back were made of fine deal, and the sides of beech. The sloping side of the instrument, which is made of beech, is provided with seventy-two pegs, round which are wound the ends of the same number of strings, the other ends of the strings being fastened to the other end of the instrument. The strings pass over a bridge; and in order to aid the resonance, the face of the instrument is pierced in two places. The strings are made of lamb's gut, and are arranged in triplets, each note having three strings tuned in unison; but we are not aware whether the intervals between adjoining triplets are semitones or whole tones. The fore finger of each hand is armed with a plectrum made of a thin piece of buffalo's horn, kept close to the finger by a sort of thimble or sheath; and with these plectra the strings are touched. The player sits down, in the attitude customary among Oriental nations, and places the instrument on his knees.

In different parts of the world, instruments are in use bearing more or less a relation to those which we have described; but their nature will be sufficiently appreciated by bearing in mind that the strings are of nearly equal length, as in the lyre; or of different lengths, as in the harp; or that the whole are laid horizontally, as in the dulcimer; but that none of them have a finger-board, as in the lute and guitar.



[A Player on the Ckánoón.]

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